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14. ABSTRACT

This is the final report for ONR grant N00014-07-1-0944 entitled, "Investigating the amplitude and phase scintillations of new GPS signals". During the period of performance, we developed two software receivers, one of which can track the new L2C signal transmitted by GPS block IIRM satellites. We also modeled the effects of scintillation on GPS signals and developed a GPS signal simulation of the fades for testing receivers.

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Final Report for
Investigating the Amplitude and Phase Scintillations of New GPS Signals

P.I.: Paul M. Kintner, Grant # N00014-07-1-0944

1. We developed two new GPS software receivers for investigating and phase and amplitude scintillations. Both receivers operate on a DSP chip. The first receiver is an L1CA receiver. The hardware for the second receiver is an L1CA/L2C receiver and is shown in Figure 1. We are currently completing the software for the latter receiver.

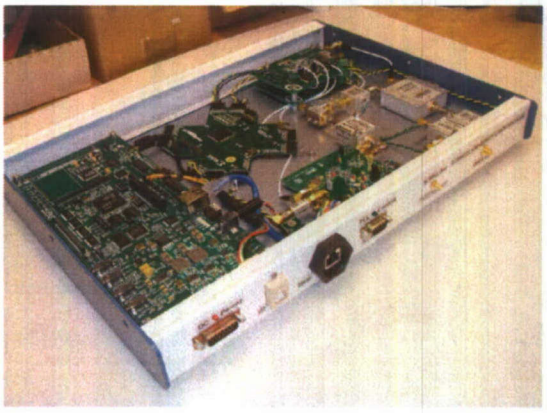

Figure 1. Hardware for an L1CA/L2C DSP receiver or the GRID Mark 0 receiver.

2. We developed a scintillation model that can be used with GPS signal simulators. The scintillation model is described in the three papers by Humphreys et al. in the publication list.

Publications

Cerruti, A., P.M. Kintner, D.E. Gary, A.J. Mannucci, R.F. Meyer, P.H. Doherty, and A.J. Coster (2008), The effect of intense December 2006 solar radio bursts on GPS receivers, *Space Weather*, doi:10.1029/2007SW000375, in press.

Humphreys, T.E., M.L. Psiaki, B.M. Ledvina, A.P. Cerruti, and P.M. Kintner, Jr., A data-driven simulation testbed for evaluating GPS carrier tracking loops in severe ionospheric scintillation, *IEEE Transactions on Aerospace and Electronic Systems*, in review, 2008.

Humphreys, T.E., M.L. Psiaki, and P.M. Kintner, Jr., Modeling the effects of ionospheric scintillation on GPS carrier-phase tracking, *IEEE Transactions on Aerospace and Electronic Systems*, in review, 2008.

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Shang, S.P., J.K. Shi, P.M. Kintner, W.M. Zhen, X.G. Luo, S.Z. Wu, and G.J. Wang, Response of Hainan GPS ionospheric scintillations to the different strong magnetic storm conditions, *Adv. Space Res., 41*(4), 579-586, 2008.